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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/088,727
Filing Date: July 19, 2002
Appellant(s): KNOLL ET AL.

Richard L. Mayer
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 5/12/2005 appealing from the Office action mailed 8/5/2004.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

The examiner is not aware of any related appeals, interferences, or judicial proceedings, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

Claims 25 and 42 been amended subsequent to the final rejection.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

The amendment after final rejection filed on 9/27/2004 has been entered.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

Jost et al. (U.S. Patent 4,919,517)

Kleinschmidt (U.S. Patent 6,750,832)

Addeo et al. (U.S. Patent 5,280,540)

Bae (U.S. Patent 5,309,238)

Hwang et al. (U.S. Patent 6,317,170)

The following are attached to the present Examiner's Answer:

Exploratorium: Science Snacks: Real Image

(http://www.exploratorium.edu/snacks/real_image/) (Created on 4/20/1999.)

Real Image – Wikipedia, the free encyclopedia (http://en.wikipedia.org/wiki/Real_image) (modified on 6/28/2005)

Virtual Image – Wikipedia, the free encyclopedia (http://en.wikipedia.org/wiki/Virtual_image) (modified on 6/10/2005)

Hecht, Eugene (Optics Third Edition pgs 152, 153, and 188; 1998 Addison Wesley Longman)

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

I. Claims 16-26 and 31-42 are rejected under 35 U.S.C. § 103(a) in view of Jost et al. in view of Kleinschmidt.

Jost teaches in figure 1 a display apparatus in a vehicle, comprising:

A projection unit (5) arranged one of on a vehicle roof and on an inside mirror of the vehicle (Jost's projection unit is arranged on the vehicle roof in the position where an inside mirror would normally be placed); and

A display surface (11), which is outside the projection unit (arranged on an instrument panel adjacent to the windshield as claimed in applicant's claim 17, 34, and 37), onto which the projection unit generates an image.

Jost further teaches a reflective surface (windshield) arranged adjacent to the display surface onto which the light is deflected towards the viewer as is claimed by applicant's claims 19 and 20.

Jost teaches a virtual image is generated on the further reflective surface, however, Jost does not teach what kind of image is generated on the display surface (presumably, because Jost does not intend for the driver of the vehicle to look at the display surface, however it should be noted that it is well within the skill of one of ordinary skill in the art that the display surface taught by Jost can be used to generate a real image.)

Kleinschmidt teaches in figure 23, a vehicle based projection system, which displays both a virtual and real image at the same time. The driver can view the image reflected off the windshield (as is done in Jost), which is virtual, or view the display surface directly (DIF), which is a real image. Kleinschmidt teaches in column 15 lines 5-12 that by displaying both, the driver can choose which he/she prefers, since as is well known to those of ordinary skill in the art at the time the invention was made, virtual and real images each have separate advantageous and in different driving conditions/environments one or the other is advantageous. Kleinschmidt differs from Jost in that it is a rear projection system rather then a front projection system, however Jost teaches in column 1 lines 52-59 that by using a front projector (which is well known in the art to be interchangeable with rear projectors) and mounting it on the ceiling, space in the vehicle can be better utilized.

Accordingly, given the advantageous taught by Kleinschmidt of both displaying the real image on the display surface so that the driver can see it and the virtual image on a reflective surface (windshield), and the teaching of Jost of the advantages of using a front projector mounted on the roof of the vehicle and it being in the skill of one of ordinary skill in the art to combine the teachings of Jost and Kleinschmidt, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Jost in view of Kleinschmidt so that a real image was generated on the display surface by the projection unit in such a manner as a user (driver) could see a real image generated on the display surface as well as the virtual image on the windshield.

With regards to applicant's claims 21, 22, 35, 38, and 39:

Jost teaches in figure 3 that the display surface (where the real image is formed in view of Kleinschmidt) comprise of a structural pattern which is specified (in column 2 line 60 and claimed in claim 5) to be a Fresnel mirror, which those with ordinary skill in the art would recognize as a roughening of the display surface as is claimed in applicant's claims 18 and 21. Alternatively it can be constructed of a holographic optical element (as taught in column 3 lines 63-67 and claim 4) as is claimed in applicant's claims 22 and 39. All patterns both the Fresnel and holographic surfaces are well known for use in producing real images (Kleinschmidt alternatively teaches a Fresnel lens, since Kleinschmidt teaches a rear projection system for forming the real image.)

With regards to applicant's claims 23, and 40:

As shown in figure 3 of Jost, the Fresnel mirror pattern is roughly a saw tooth structure in a 2 dimensional cutout.

With regards to applicant's claims 24 and 42:

As shown in figure 24 of Kleinschmidt the real image display surface is of semi-spherical configuration (it is curved.)

With regards to applicant's claims 25, 26, and 33:

It is well known in the video arts to use one image source to display/project two images; specifically the video processing hardware takes two images and displays the first image in one portion of the display surface and a second image in a second surface portion of the display surface is done with picture in picture. (See for example US patent 5,280,540 to Addeo et al. and US 5,309,238 to Bae.) Since LCD projectors (which Jost teaches it can be in column 2 line 6 and as claimed in applicant's claim 33), which are a type of video projector as is claimed by applicant's claim 26, commonly are used to project TV type images and are well known to include video processing processors that have the capabilities of TV's, it would be obvious for one of ordinary skill in the art to have designed Jost in view of Kleinschmidt's projector to have picture in picture capability as well, so that the driver can watch his speed while reading a map for example. (It should be noted that Kleinschmidt even suggests this capability in column 15.)

With regards to applicant's claim 31:

Kleinschmidt teaches in column 15 lines 7-14 that the display on the windshield can be darkened, so only the real image/ display can be seen.

With regards to applicant's claim 32:

It is obvious that a Fresnel mirror or holographic mirror scatters light as taught by Jost in view of Kleinschmidt.

With regards to applicant's claim 36:

Kleinschmidt teaches that the light from the display apparatus is directed towards the viewer.

With regards to applicant's claim 41:

As shown in figure 1 of Jost the path of light from the projection unit to the display surface is at least approximately parallel to the windshield of the vehicle.

II. Claims 27-30 are rejected under 35 U.S.C. § 103(a) in view of Jost et al. in view of Kleinschmidt as applied to claims 24-26 above and further in view of Hwang et al.

As described in more detail above, among other things Jost in view of Kleinschmidt teaches that the projector can be an LCD projector; Jost in view of Kleinschmidt does not necessarily teach that the projector is a laser type projector.

Hwang et al. teaches in figure 3 a laser projector, which comprises 3 light sources (150) of different colors (red, green, and blue) as is claimed in applicant's claim 29, which are combined and scanned by a means for scanning (900) and projected on a display surface (1000.) The light sources (150) comprise of laser diodes (see column 5 line 67), which is a laser beam generation unit as is claimed by applicant's claim 27 As shown in figure 1 and as is well known in the art, scanning means comprises of moving mirrors (80 and 70) as is claimed by applicant's claim 28.

Hwang teaches in column 1 lines 19-35 that the LCD type projector taught by Jost in view of Kleinschmidt has the limitation of requiring large amounts of power to generate a significantly bright image, Hwang further teaches that laser projectors overcome this in lines 36-48. Since presumably the projector of Jost in view of Kleinschmidt is to be operated in both nighttime and daytime conditions, the projector needs to be significantly bright for daytime operation. Since it is desirable to use as little power as possible in a vehicle (as this decreases fuel efficiency and automotive electrical systems have limited capacity as compared to a home or theater), it would be obvious to one of ordinary skill in the art at the time the invention was made to use a laser projector

as taught by Hwang for the LCD type projector taught by Jost in Jost in view of Kleinschmidt's display apparatus in a vehicle.

With regards to applicant's claim 30, Jost in figure 1 shows that the display surface is approximately parallel to a windshield of the vehicle.

(10) Response to Argument

I. Rejection of claims 16-26 and 31-42 under 35 U.S.C. § 103(a) in view of Jost et al. and in view of Kleinschmidt.

Appellant argued that the references relied upon: Jost and Kleinschmidt, do not disclose or suggest the projection of a Real Image to one of ordinary skill in the art at the time the invention was made.

The examiner disagreed. A real image is defined in the optical arts as follows: "*Real Image* is a term used in optics and physics. It is a representation of an actual object (source) formed by rays of light passing through the image, wherein if a screen is placed in the plane of a real image it will generally become visible. Real Images can be produced by concave mirrors." (See "Real image – Wikipedia, the free encyclopedia" attached hereto. See a similar definition in the paragraph-spanning page 152 and 153 of the Hecht reference attached hereto.) On page 188 of the Hecht reference, a table (5.5) is provided which teaches whether a real or virtual image (see the definition of Virtual image provided by the "Virtual image –Wikipedia, the free encyclopedia" reference attached hereto for an explanation of what a Virtual image is defined as in the optics arts) is formed by a concave mirror depending on the placement of the source (object) of the image.

Appellant asserts on the first full paragraph of page 10 of the appeal brief that real images cannot be produced on mirrors and gives various reasons for why they cannot.

Clearly the Hecht and Wikipedia references contradict this assertion. Further attached hereto is explanation of the floating coin toy that was mentioned in the advisory action mailed on 10/05/2004, The Exploratorium: Science Snacks: Real Image teaches how to make the well known floating coin toy and clearly states in its title that this is a demonstration of a real image. (These references have been offered in the examiner's answer as documentary evidence of Official notice taken of a well-known fact/definition. The characteristics and properties of material or scientific truism and are therefore eligible as prior art as discussed in MPEP 2124.)

From the above discussion of the ordinary definition of Real Image used in the art and a reading of appellant's argument, it appears that Appellant was using a more narrow definition of a Real Image then what was commonly used in the optical arts (and much more narrow then the literal dictionary definition.) In *Brookhill-Wilk 1, LLC v. Intuitive Surgical, Inc.* (67 USPQ2d 132, 1136 (Fed. Cir. 2003)) it was stated "the absence of an express intent to impart a novel meaning to the claim terms, the words are presumed to take on the ordinary and customary meanings attributed to them by those of ordinary skill in the art." Since applicant had not made clear in the disclosure a clear intent to impart a novel meaning to the term "Real image" the definitions provided by pertinent reference sources such as the Hecht reference must be used in order to give the broadest reasonable interpretation. (See also *Ferguson Beauregard /Logic Controls v. Mega Systems* (69 USPQ2d 10001, 1009 (Fed. Cir. 2003)) and *ACTV, Inc. v. The Walt Disney Company* (68 USPQ2d 1516, 1524 (Fed. Cir. 2003). It was clear from well known art evidenced by Hecht and Wikipedia references that curved mirrors can make real images and the

Kleinschmidt reference teaches that it was desirable to make real images in vehicular environment; it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Jost et al. reference with Kleinschmidt to teach the claimed invention as discussed in the 35 U.S.C. § 103(a) rejection. Appellant's other arguments with response to this rejection are predicated at least in part on appellant's belief that the mirror of Jost et al. was unable to produce a real image as claimed in appellant's claims, which has been shown above to be false.

Appellant argues that the combination of the Jost reference with the Kleinschmidt reference in a 35 U.S.C. § 103(a) rejection is the result of hindsight, and broad conclusory statements standing alone.

The examiner disagreed. Appellant's arguments are in part based on the assertion that Jost is incapable of producing a real image, which has been shown above, to be false. Since it is shown that the Jost reference is capable of making a real image without being destroyed, the remaining issue is whether Kleinschmidt teaches a motivation for making a real image for the driver to view in addition to the virtual image that Jost explicitly teaches. Kleinschmidt offers such a motivation in column 15 lines 5-12 for having both displays, "The driver PE can thus decide which presentation he prefers or which information he wishes to see on which display." Clearly since virtual images and real images each have their own advantages for vehicle displays; Kleinschmidts statement in column 15 lines 5-12 that such a configuration as taught by Kleinschmidt, where there is both virtual and real image displays viewable by the driver, provides a distinct advantage

over the literal teaching of Jost that only teaches specifically that a virtual image is formed on the windshield and is silent about what is formed on the mirror or if the driver can directly view the mirror. Since Kleinschmidt provides motivation to modify Jost as described above, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make such a modification. Said motivation is not a result of broad conclusory statements, as Jost teaches the means and Kleinschmidt clearly teaches the motivation as just demonstrated, it would have been obvious to modify Jost to be able to view a real image on the mirror and a virtual image on the windshield.

For the above reasons, it is believed that Rejection I should be sustained.

II. Rejection of claims 27-30 under 35 U.S.C. § 103(a) in view of Jost et al. and Kleinschmidt and further in view of Hwang.

Appellant argues that Jost in view of Kleinschmidt does not teach a Real image and the teachings of Hwang do not provide such a teaching.

The examiner disagreed. As discussed above the teaching of a Real image was provided by Jost in view of Klienschmidt. The teaching Hwang was only provided to teach the laser projector and since as was well known by those of ordinary skill in the art at the time the invention was made as evidenced above, Jost in view of Kleinschmidt was capable of generating a Real image. Accordingly it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Jost in view of

Klienschmidt and further in view of Hwang to teach the limitations of claims 27-30 as described in the above rejection of claims 27-30 under 35 U.S.C. § 103(a).

For this reason, it is believe that rejection II should be sustained.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Andrew Sever

Conferees:

JN
Judy Nguyen

and

AHH
Andrew Hirshfeld

Judy Nguyen

JUDY NGUYEN
SUPERVISORY PATENT EXAMINER

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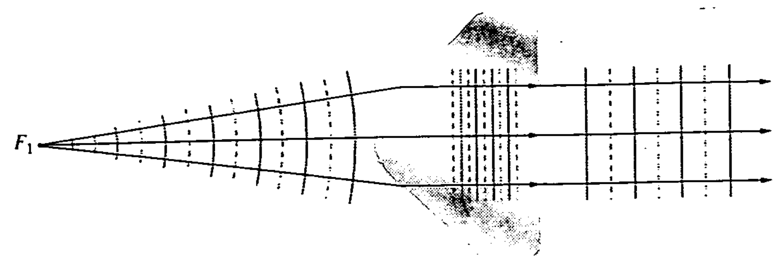
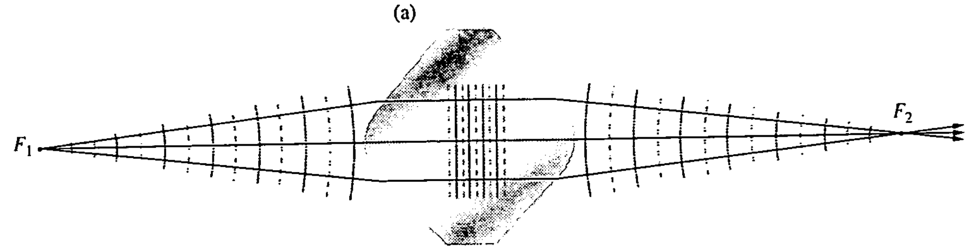


(a)



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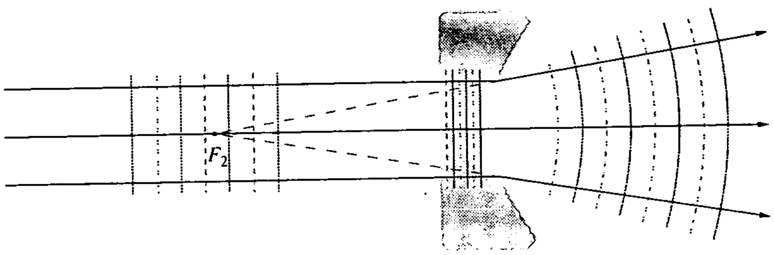


(c)

(d)

FIGURE 5.5 (*a*), (*b*), and (*c*) Several hyperbolic lenses seen in cross section. To explore an ellipsoidal lens see Problem 5.4. (*d*) A selection of aspherical lenses. (Photo courtesy Melles Griot.)

In contrast, a **concave** lens (from the Latin *concavus*, meaning hollow—and most easily remembered because it contains the word cave) is thinner in the middle than at the edges, as is evident in Fig. 5.5*c*. It causes the rays that enter as a parallel bundle to diverge. All such devices that turn rays outward away from the central axis (and in so doing add divergence to the beam) are called **diverging lenses**. In Fig. 5.5*c*, parallel rays enter from the left and, on emerging, seem to diverge from F_2; still, that point is taken as a focal point. **When a parallel bundle of rays passes through a converging lens, the point to which it converges (or when passing through a diverging lens, the point from which it diverges) is a focal point of the lens.**

If a point source is positioned on the central or optical axis at the point F_1 in front of the lens in Fig. 5.5*b*, rays will *converge* to the conjugate point F_2. A luminous image of the

source would appear on a screen placed at F_2, an image that is therefore said to be **real**. On the other hand, in Fig. 5.5*c* the point source is at infinity, and the rays emerging from the system this time are *diverging*. They appear to come from a point F_2, but no actual luminous image would appear on a screen at that location. The image here is spoken of as **virtual**, as is the familiar image generated by a plane mirror.

Optical elements (lenses and mirrors) of the sort we have talked about, with one or both surfaces neither planar nor spherical, are referred to as *aspherics*. Although their operation is easy to understand and they perform certain tasks exceedingly well, they are still difficult to manufacture with great accuracy. Nonetheless, where the costs are justifiable or the required precision is not restrictive or the volume produced is large enough, aspherics are being used and will surely have an increasingly important role. The first quality glass aspheric to be manufactured in great quantities (tens of millions) was a lens for the Kodak disk camera (1982). Today aspherical lenses are frequently used as an elegant means of correcting imaging errors in complicated optical systems.

A new generation of computer-controlled machines, aspheric generators, is producing elements with tolerances (i.e., departures from the desired surface) of better than 0.5 μm (0.000 020 inch). This is still about a factor of 10 away from the generally required tolerance of $\lambda/4$ for quality optics, but that will surely come in time. Nowadays aspherics made in plastic and glass can be found in all kinds of instruments across the whole range of quality, including telescopes, projectors, cameras, and reconnaissance devices.

FIGURE 5.6 Polishing a spherical lens. (Photo courtesy Optical Society of America.)

5.2.2 Refraction at Spherical Surfaces

Imagine two pieces of material, one with a concave and the other a convex spherical surface, both having the same radius. It is a unique property of the sphere that such pieces will fit together in intimate contact regardless of their mutual orientation. Thus, if we take two roughly spherical objects of suitable curvature, one a grinding tool and the other a disk of glass, separate them with some abrasive, and then randomly move them with respect to each other, we can anticipate that any high spots on either object will wear away. As they wear, both pieces will gradually become more spherical (Fig. 5.6). Such surfaces are commonly generated in batches by automatic grinding and polishing machines.

Not surprisingly, the vast majority of quality lenses in use today have surfaces that are segments of spheres. Our intent here is to establish techniques for using such surfaces to simultaneously image a great many object points in light composed of a broad range of frequencies. Image errors, known as **aberrations**, will occur, but it is possible with the present technology to construct high-quality spherical lens systems whose aberrations are so well controlled that image fidelity is limited only by diffraction.

Figure 5.7 depicts a wave from the point source S impinging on a spherical interface of radius R centered at C. The

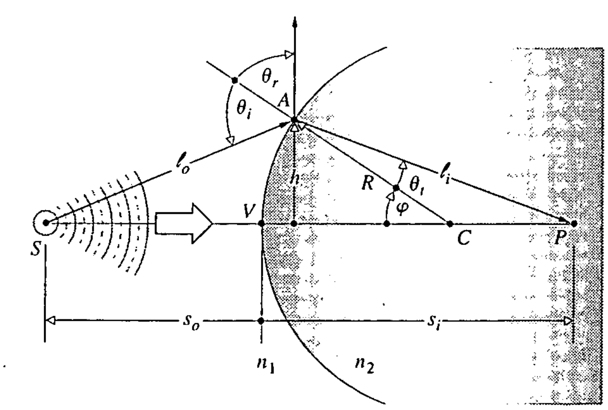


FIGURE 5.7 Refraction at a spherical interface. Conjugate foci.

Table 5.4 Sign Convention for Spherical Mirrors

Quantity	Sign +	Sign −
s_o	Left of V, real object	Right of V, virtual object
s_i	Left of V, real image	Right of V, virtual image
f	Concave mirror	Convex mirror
R	C right of V, convex	C left of V, concave
y_o	Above axis, erect object	Below axis, inverted object
y_i	Above axis, erect image	Below axis, inverted image

structure of the optical element (n, R, etc.) is that for f, and so, understandably, it differs for the thin lens [Eq. (5.16)] and spherical mirror [Eq. (5.49)]. The other functional expressions that relate s_o, s_i, and f or y_o, y_i, and M_T are, however, precisely the same. The only alteration in the previous sign convention appears in Table 5.4, where s_i on the left of V is now taken as positive. The striking similarity between the properties of a concave mirror and a convex lens on one hand and a convex mirror and a concave lens on the other are quite evident from a comparison of Tables 5.3 and 5.5, which are identical in all respects.

Table 5.5 Images of Real Objects Formed by Spherical Mirrors

Concave

Object Location	Image Type	Image Location	Image Orientation	Image Relative Size
$\infty > s_o > 2f$	Real	$f < s_i < 2f$	Inverted	Minified
$s_o = 2f$	Real	$s_i = 2f$	Inverted	Same size
$f < s_o < 2f$	Real	$\infty > s_i > 2f$	Inverted	Magnified
$s_o = f$		$\pm\infty$		
$s_o < f$	Virtual	$\|s_i\| > s_o$	Erect	Magnified

Convex

Object Location	Image Type	Image Location	Image Orientation	Image Relative Size
Anywhere	Virtual	$\|s_i\| < \|f\|$, $s_o > \|s_i\|$	Erect	Minified

The properties summarized in Table 5.5 and depicted in Fig. 5.61 can easily be verified empirically. If you don't have a spherical mirror at hand, a fairly crude but functional one can be made by carefully shaping aluminum foil over a spherical form, such as the end of a lightbulb (in that particular case R and therefore f will be small). A rather nice qualitative exper-

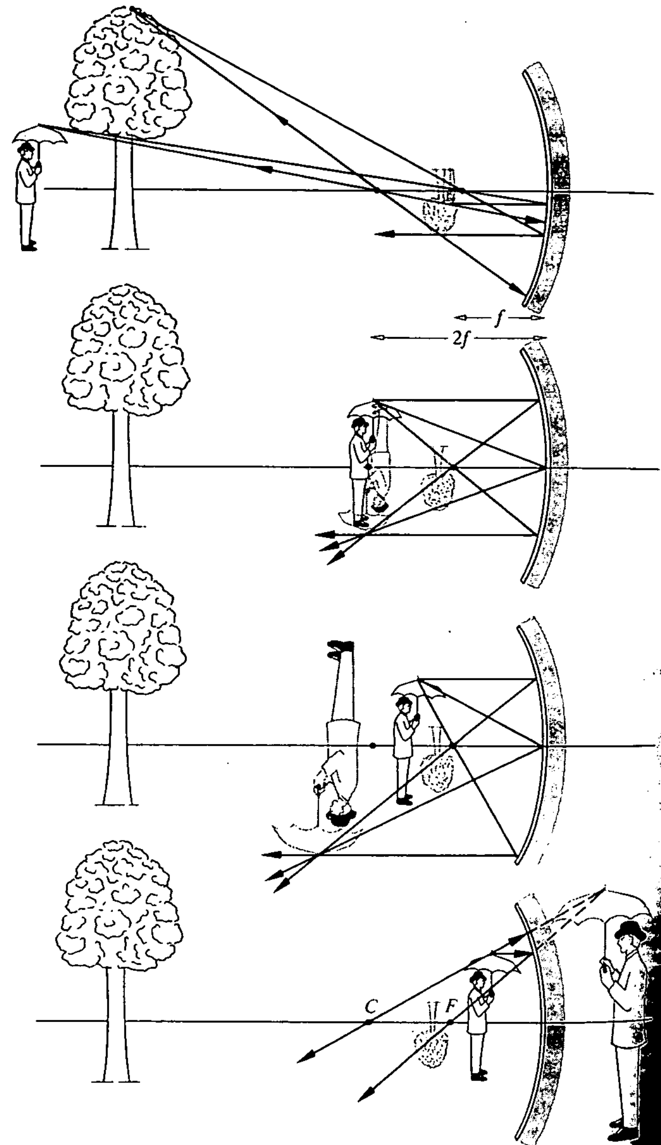
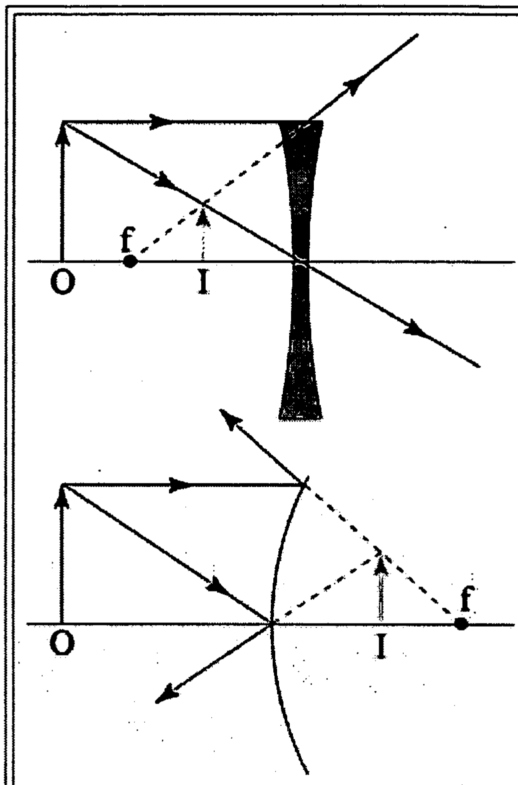


FIGURE 5.61 The image-forming behavior of a concave spherical mirror.

Virtual image

From Wikipedia, the free encyclopedia.

Virtual image is a term used in optics and physics. It is a representation of an actual object (source) formed by diverging rays of light which seem to originate from the image, but in reality do not cross at that position. A screen or an observer placed where a virtual image appears to be cannot actually "see" it.



Top: The formation of a virtual image using a concave lens. Bottom: The formation of a virtual image using a convex mirror. In both diagrams, *f* is the focal point, *O* is the object and *I* is the image, shown in grey. Solid blue lines indicate light rays. It can be seen that the light rays appear to emanate from the virtual image but do not actually exist at the position of the virtual image. Thus an image cannot be formed by placing a screen at the position of the virtual image.

For example, a plane or convex mirror forms a virtual image positioned behind the mirror. Although rays of light seem to come from behind the mirror, light from the source spreads and exists only in front of the mirror.

See also

- Real image

Retrieved from "http://en.wikipedia.org/wiki/Virtual_image"

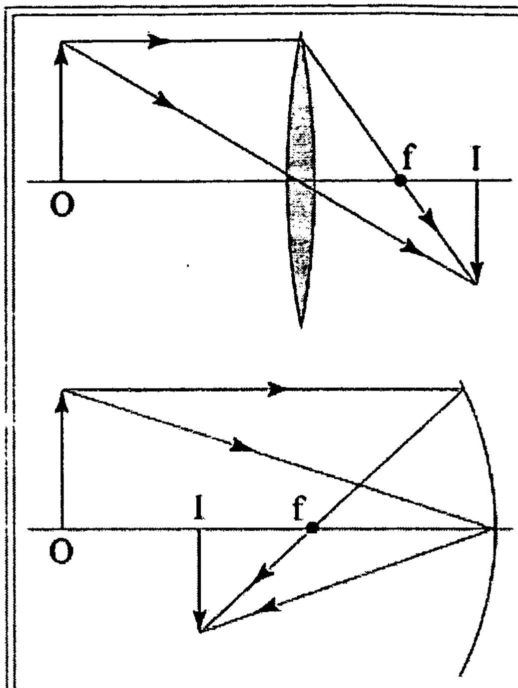
Categories: Optics

Real image

From Wikipedia, the free encyclopedia.

Real image is a term used in optics and physics. It is a representation of an actual object (source) formed by rays of light passing through the image. If a screen is placed in the plane of a real image it will generally become visible.

Real images can be produced by concave mirrors and converging lenses.



Top: The formation of a real image using a convex lens. Bottom: The formation of a real image using a concave mirror. In both diagrams, *f* is the focal point, *O* is the object and *I* is the image. Solid blue lines indicate light rays. It can be seen that the image is formed by actual light rays and thus can form a visible image on a screen placed at the position of the image.

See also

- Virtual image

Retrieved from "http://en.wikipedia.org/wiki/Real_image"

Categories: Optics

Real Image

A snack version of Mirror Mirage

Perception Light

Create the image of an object in space using a $2 ornament.

materials

✔ **4" silvered plastic Christmas tree ornament**

assembly

These ornaments are available in the months preceeding Christmas from Michael's Craft Stores.

Using a band saw cut the top off one half of the ornament creating a circular hole that is about 3.5 cm in diameter. You will be trimming only 0.5 cm off the top. Then trim a slice 1.8 cm off the bottom of the same half. Remove the little bits of plastic carefully with a soft cloth. Place the trimmed half inside the unaltered half.

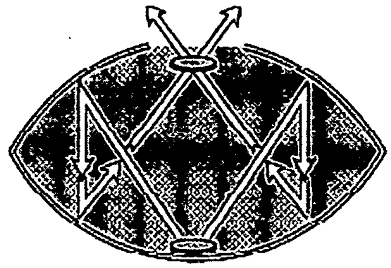
to do and notice

Place an object, such as a pushpin, inside the sphere. View the image at an angle nearly horizontal to your eye. Locate the image of the object that has the same orientation as the object. Touch the image with a finger.

what's going on?

You are seeing an image formed by two concave mirrors facing one another. The object is placed at the center of the bottom mirror. The curvature of the mirrors is such that the object is at the focal point of the top mirror.

When light from a point on the object hits the top mirror, it reflects in parallel rays. These parallel rays hit the bottom mirror and reflect so that they reassemble to form a point located at one focal length from the bottom mirror. The mirrors are placed so that the focal point of the bottom mirror is located at the hole in the top of the device. The end result is that light from every point on the object is assembled into an image in the hole.



The ray diagram may help explain this effect.

By
Heidi Strahm Black

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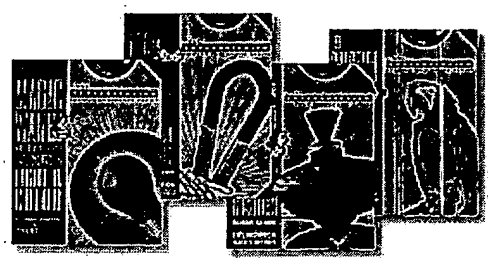
Snack Discussion Group

If you'd like to order any of the Science Snackbooks please visit the **Exploratorium Online Store**.



EXPLORATORIUM SNACK HOME PAGE

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<!--This file created 4/20/99 3:15 PM by Claris Home Page version 3.0-->
<HEAD>
   <TITLE>Exploratorium: Science Snacks: Real Image</TITLE>
   <meta name="category" content="handson">
   <META NAME=GENERATOR CONTENT="Claris Home Page 3.0">
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN"><META HTTP-EQUIV="Content-Type"
CONTENT="text/html;CHARSET=iso-8859-1">
</HEAD>
<BODY BGCOLOR="#FFFFFF" TEXT="#000000" LINK="#003399" VLINK="#999999">
<CENTER>
<td width="455" height="101" align="center" valign="top">
        <div align="center">
          <p><font face="Verdana, Arial, Helvetica, sans-serif"><img
src="../gen_images/snack_logo.gif" height="48"><br>
            <a href="../snacksbysubject.html"><img
src="../gen_images/subject-sm.gif" width="152" height="30" border="0"></a><a
href="../snacksupplies.html"><img src="../gen_images/supplies-sm.gif" width="151"
height="30" border="0"></a><a href="../index.html"><img
src="../gen_images/a_to_z-sm.gif" width="152" height="30" border="0"></a></font></p>
        </div></td></CENTER>

<H1><CENTER>Real Image</CENTER></H1>

<H2><CENTER>A snack version of Mirror Mirage</CENTER></H2>

<CENTER><A HREF="../iconperception.html"><IMG
SRC="../gen_images/icons/perception.gif" WIDTH=60 HEIGHT=75 BORDER=0
ALIGN=bottom></A> 
<A HREF="../iconlight.html"><IMG SRC="../gen_images/icons/light.gif" WIDTH=60
HEIGHT=75 BORDER=0 ALIGN=bottom></A></CENTER>

<P>Create the image of an object in space using a $2 ornament.

<P><IMG SRC="../gen_images/materials.gif" WIDTH=255 HEIGHT=19 ALIGN=bottom>

<P><IMG SRC="../gen_images/tick.gif" WIDTH=11 HEIGHT=10 ALIGN=bottom> <B>
4" silvered plastic Christmas tree ornament</B>

<P><IMG SRC="../gen_images/assembly.gif" WIDTH=256 HEIGHT=23 ALIGN=bottom><BR>
<BR>
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      <TD VALIGN=top WIDTH="100%" HEIGHT=41>
         <P>These ornaments are available in the months preceeding
         Christmas from Michael's Craft Stores.

         <P>Using a band saw cut the top off one half of the ornament
         creating a circular hole that is about 3.5 cm in diameter.
         You will be trimming only 0.5 cm off the top. Then trim a
         slice 1.8 cm off the bottom of the same half. Remove the
         little bits of plastic carefully with a soft cloth. Place
         the trimmed half inside the unaltered half.
      </TD>
      <TD VALIGN=top WIDTH="34%" HEIGHT=41>
         <P>
      </TD>
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</TABLE>

<P><IMG SRC="../gen_images/tdn.gif" WIDTH=256 HEIGHT=19 ALIGN=bottom><BR>
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